SPECIFICATIONS FOR PROVISION OF SERVICE CONNECTION

Revised on 01-07-2021

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TECHNICAL SPECIFICATIONS

1.0 General

1.1 Pipes to be laid with a minimum cover of 750mm from the road surface irrespective of the depth of the distribution main and the class or the category of the road. Common mains shall be laid at depths specified in the specification for Trench Excavation and Backfilling.

1.2 Width of the trench excavated shall be minimum of 400mm required for efficient work after allowing for shoring. Material excavated from trenches shall be laid such a way that it would not obstruct the road as to prevent the passage of traffic. The soil filled over the top of the pipe shall be free from stones & filled with care. Re-filling of excavated area shall be carried out in layers, and as specified in the specification.

1.3 In regulating traffic flow sufficient barricades, signboards, warning tapes and lightings shall be provided. Blinking light shall be provided during night work.

1.4 Prior approval for deviation to the specifications/BOQ shall be obtained in writing from the Engineer. Excavation to be done from the main distribution pipe up to 1.5 meter beyond the boundary of the premises (1.5m inside the premises).

1.5 The Contractor shall not use additional material (pipes, special, valves etc.) other than provided by the Engineer, and in the service connection. In cases of deviation from this rule, Contractor shall obtain prior approval of the Engineer.

1.6 The Contractor shall submit a demand note, for the materials required for service connections assigned by the Board, which should be approved by the Engineer and shall supply the materials according to the work programme.

1.7 No pipe lines shall be passed through by breaking drains, walls of canals, culverts or permanent structures, if any, and shall always be laid below the same. Where such breakages are necessary, Contractor shall obtain prior approval of the Engineer.

1.8 The excavated pit at the tapping point at the main pipe line shall be filled with sand up to 300 mm below the road surface and with ABC mixture upto the road surface and well compacted. The excavated trench upto the boundary of the premises shall be filled with ABC mix in 150 mm thick layers upto the road surface and well compacted on Asphalt roads. Excavated soil may be used for gravel roads depending on the properties of the soil. Proper compaction shall be carried out to the satisfaction of the Engineer.

1.9 Contractor shall at his cost remedy/re-do any work which is completed or in progress if such works are found to be not conform to the specification.

1.10 The Contractor shall provide all labour plant and equipment as specified in the schedule for the performance of the contract according to the specifications, drawings & Bill of Quantities. If contractor feels that additional labour, plant and equipment in addition to specified in the schedule required for the completion of the work, he shall so provide them.

1.11 Contractor shall take every precautions to avoid damages or injuries to his own Staff, Gang, Employers staff at site, public and any property belongs to the Employer, public and third party.

Any damage or injury or disablement to his staff, Employer staff and Public due to his work or in connection with the work shall be compensated by the Contractor by the Insurance cover.

Any damage to Employers property, public property or any private property shall be remedied by the Contractor and shall be compensated by the Contractor and contractor shall indemnify the Employer from all such claims.

In the event of the contractor failing to act accordingly, the NWS&DB may make all compensations or do all making good or settle all claims, damages, costs & expenses and the cost of such procedure as well as the amount paid will be deducted from and act of any sum or sums that is due or may become due to the Contractor under the terms of the agreements or otherwise.

1.12 The Contractor shall carryout the excavation for main tapping work according to the recommended dimensions.

1.13 The contractor shall not operate the valves and other accessories of the distribution system under any circumstances.

1.14 Prior approval from Road Authority is a mandatory requirement for the excavations for service connections. For leak repair at least verbal approval shall be obtained from the relevant road authority and shall inform the relevant road authority and confirm the verbal approval in-writing later.

1.15 Back filling of service connections from the tapping point up to the meter chamber on Asphalted roads and tarred roads shall be carried out using the following materials.

i. Quarry dust/ Sand filling for pipe bedding and upto 200 mm above the crown of pipe and compacted
ii. Rest with the ABC upto the road level and well compacted in 100 mm thick Layers to obtain 98% compaction.
iii. Excavated soil shall be disposed properly away from the location.

For gravel roads, use excavated soil and compact in 150 mm thick layers to obtain 98% compaction without causing any damage to the under ground utilities or pipeline. If excavated soil is not good for the compaction, suitable soil shall be imported to the site or quarry dust/ ABC shall be used as directed by the Engineer.

All excavations shall be backfilled, compacted and finished on the same day. No trench shall be left open in any case. If work is partly done for the day, trench shall be backfilled completely and re-excavate in next day. All costs associated with the re-excavation and backfilling shall be borne by the Contractor.

1.16 Safety is very important and shall be equipped with Barricades and tapes, cones, safety jackets with luminous tapes.

1.17 Contractor shall employ suitable persons with sign boards for traffic diversion until the work is completed.

2.0 Jointing Procedure for joints in Service Connection

Reference Standards

ASTM F2620 Standard Practice for Heat Fusion of Polyethylene Pipe and Fittings (Socket fusion)

This practice describes procedures for making joints in service connections with High Density Polyethylene (HDPE) pipe and fittings by means of heat fusion joining in, but not limited to, a field environment.

2.1 **Socket Fusion**—The socket-fusion procedure involves simultaneously heating the outside surface of a pipe end and the inside of a fitting socket, which is sized to be smaller than the smallest outside diameter of the pipe. After the proper melt has been generated at each face to be mated, the two components are joined by inserting one component into the other. See Fig.1. The fusion bond is formed at the interface resulting from the interference fit. The melts from the two components flow together and fuse as the joint cools. Optional alignment devices are used to hold the pipe and socket fitting in longitudinal alignment during the joining process; especially with pipe sizes IPS 3 in. (89 mm) and larger. Automated socket fusion is not addressed in this procedure.

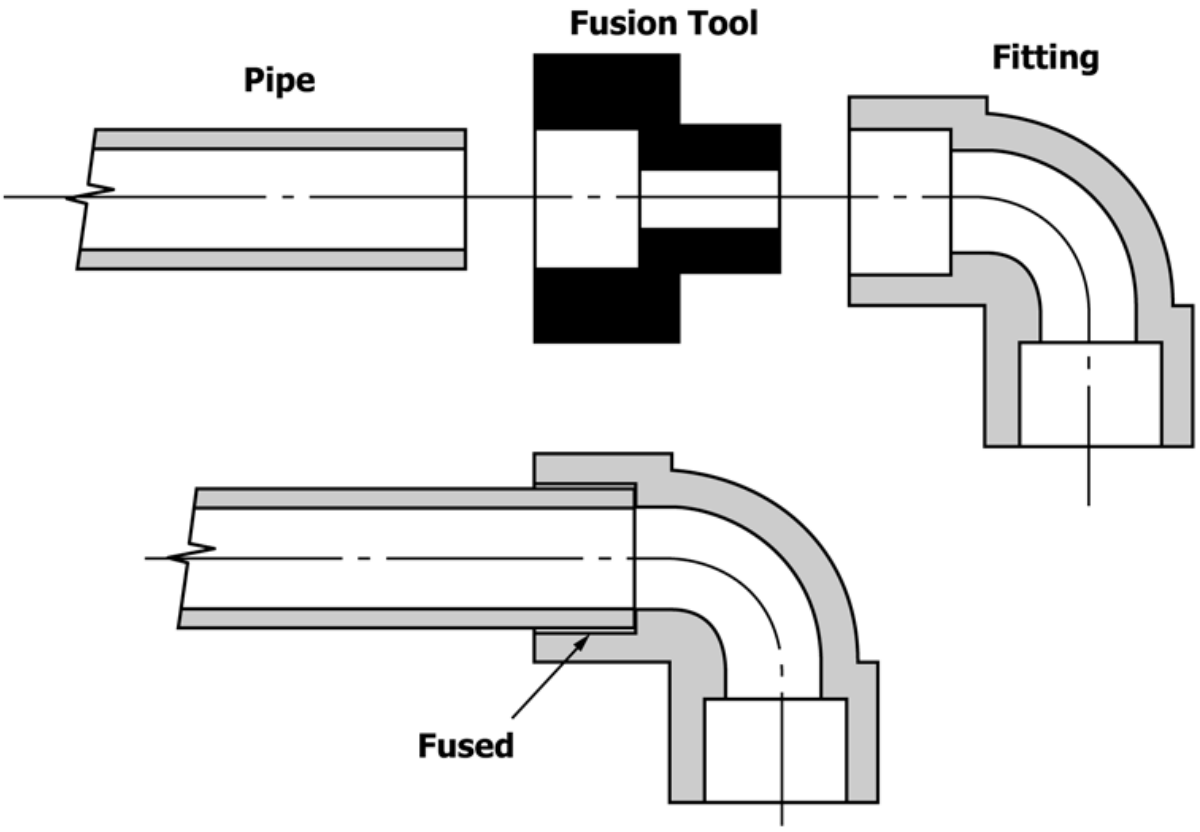


FIG. 1 Socket Fusion

2.2 Operator Experience

Skill and knowledge on the part of the operator are required to obtain a good quality joint. This skill and knowledge is obtained by making joints in accordance with proven procedures under the guidance of skilled operators. Evaluate operator proficiency by testing sample joints.

The party responsible for the joining of polyethylene pipe and fittings shall ensure that detailed procedures developed in conjunction with applicable codes and regulations and the manufacturers of the pipe, fittings, and joining equipment involved, including the safety precautions to be followed, are issued before actual joining operations begin.

2.3 Socket Fusion Apparatus

2.3.1 Socket Fusion Tools—Socket fusion tools consist of a heating tool, heating tool faces, rounding clamps (cold rings), depth gage/chamfer tools, Tubing Cutter, Alignment Jig and Fitting Ruler.

2.3.2 Heating Tool—In order to obtain a proper melt, it is necessary for a uniform temperature to be maintained across the heating tool faces. An electrical tool shall have sufficient wattage and control to maintain the specified surface temperature of the tool faces.

2.3.3 Heating Tool Faces—Consisting of two parts, a male end for the interior socket surface and a female end for the exterior pipe surface. Both parts shall be made to such tolerances as to cause an interference fit. Heating tool faces are produced to Specification ASTM F1056 dimensions, and are coated with a non-stick material to keep melted pipe and fitting material from sticking to the face.

2.3.4 Alignment Jig—The alignment jig is an optional tool which consists of two sets of devices holding the components in alignment to each other. One set of holding devices is fixed, and the other allows longitudinal movement for making the joint.

2.3.5 Rounding Clamps, (cold ring) to maintain roundness of the pipe and control the depth of pipe insertion into the socket during the joining operation.

2.3.6 Depth Gage, for proper positioning of the rounding clamp on the pipe.
2.3.7 Chamfering Tool, to bevel the end of the pipe.

NOTE -The depth gage and chamfering tool may be combined into a single tool.

2.3.8 Tubing Cutter, to obtain a square end cut on the pipe.

2.3.9 Fitting Puller, an optional tool to assist in the removal of the fitting from the heating tool and to hold the fitting during assembly.

2.4 Procedure

2.4.1 Attach the proper size heater faces to the heating tool, and bring the surface temperature of the tool faces to 490 to 510°F (254 to 266°C). Use a pyrometer, or other temperature measuring device, on the first joint of the day and periodically during the day to verify the temperature of the tool face surfaces within the pipe or fitting contact area. Select multiple checkpoints to ensure uniform surface temperature. Heating tool thermometers measure the internal temperature of the heating tool, which is typically higher than the surface temperature of the heating tool faces.

2.4.2 Cut the pipe end squarely, and clean the pipe end and fitting, both inside and outside, by wiping with a clean, dry, lint-free, non-synthetic cloth such as cotton. If this does not remove the contamination, before installing the pipe in the fusion machine, clean the OD, ID and ends with a clean, dry, lint-free, non-synthetic cloth such as cotton. If the contamination cannot be removed this way, wash the pipe with water and a clean cloth or paper towel to remove the contamination, rinse the pipe with water and dry thoroughly with a clean, dry, lint-free, non-synthetic cloth such as cotton or paper towel. If contamination, such as bar oil, was transferred to the pipe ends after cutting, use 90 % or greater isopropyl alcohol or acetone on a clean cloth or isopropyl alcohol wipes on the ends of the pipe to clean the contamination, then rinse with water and dry thoroughly on the pipe ends, ID and OD. It is important that pipe ends be clean before installing in the fusion machine to avoid contaminating fusion machine parts that contact the pipe ends such as the facer and heater. If the facer or heater becomes contaminated, the contamination may be transferred back to the pipe ends, possibly compromising joint quality. Do not use the facer to remove contamination.

2.4.3 Chamfer the outside edge of the pipe end slightly and fix the rounding clamp about the pipe as determined from the depth gage.

Some recommend using a 50-60 grit emery or garnet cloth to roughen the outside of the pipe and inside of the fitting as a means of minimizing any possible skin interface when making the fusion. Sandpaper is not recommended for this purpose, as it might disintegrate and contaminate the joint interface. If roughening is performed, first clean the surfaces before roughening with a clean cloth or water. Once the pipe or fitting surfaces have been roughened and clean material has been exposed, water cannot be used to clean the pipe surfaces. Clean dust and particles from the roughened surfaces afterwards by cleaning the pipe or fitting ends with a clean dry lint-free, non-synthetic cloth such as cotton.

2.4.4 Clean the heater adapters by wiping them with a clean, dry, lint-free, non-synthetic cloth such as cotton to remove any contamination from the surfaces. Push the socket fitting onto the preheated fitting tool face first, and then push the pipe into the pipe-side tool face until the rounding clamps make contact with the heating faces.

2.4.5 Heat the pipe end and the fitting socket for the time required in Table 1.

2.4.6 At the end of the heating time, simultaneously remove the pipe and fitting straight out from the tool, using a snap action. Immediately insert the pipe straight into the socket of the fitting so the rounding clamp is flush against the end of the fitting socket. Hold

or block the joint in place to cool for the time specified in Table 1. (For ambient temperatures 100°F and higher, additional cooling time may be needed.)

2.4.7 Remove the rounding clamp, and inspect the melt pattern at the end of the socket for a complete impression of the rounding clamp in the melt surface. There shall be no gaps, voids, or un-bonded areas. Visually inspect and compare the joint against recommended appearance guidelines. Allow the joint to cool an additional five (5) minutes before exposing the joint to any type of stresses (that is, burial, testing or fusing the other end of the fitting.)

2.4.8 Allow for extremes in weather when making field joints. Heating times, dimensional changes, etc., are affected by extreme weather conditions.

2.5 Cold Weather Handling

2.5.1 Pipe shall be inspected for damage. Polyolefin Polyethylene pipes have reduced impact resistance in sub-freezing conditions. Avoid dropping pipe in sub-freezing conditions. When handling coiled pipe at temperatures below 40°F (4.44°C), it is helpful to uncoil the pipe prior to installation and let it straighten out. Gradually uncoil the pipe and cover it with dirt at intervals to keep it from recoiling. Always use caution when cutting the straps on coils of pipe because the outside end of a coil may spring out when the strapping is removed.

2.5.2 Preparation for Socket

2.5.2.1 Wind and Precipitation

The heating tool shall be shielded in an insulated container to prevent excessive heat loss. Shield the pipe fusion area and fusion tools from wind, snow, blowing dust, and rain by using a canopy or similar device.

2.5.2.2 Pipe and Fitting Surface Preparation

The pipe and fitting surfaces to be "joined" or held in clamps shall be dry and clean and free of ice, frost, snow, dirt, and other contamination. Regular procedures for reparation of surfaces to be joined, such as facing for butt fusion and roughening for saddle fusion shall be emphasized. After preparation, the surfaces shall be protected from contamination until joined. Contamination of the area to be fused will likely cause incomplete fusion. Frost and ice on the surfaces of the pipe to be clamped in either a cold ring or alignment jigs may cause slippage during fusion. Inspect coiled pipe to see if it has flattened during storage, which could cause incomplete melt pattern or poor fusion. It may be necessary to remove several inches at the pipe ends to eliminate such distortion. Pipe may have a slight toe-in or reduced diameter for several inches at the end of the pipe. The toe-in may need to be removed before butt fusing to a freshly cut pipe end, or to a fitting.

2.5.2.3 Heating

Work quickly once pipe and fitting have been separated from the heating tool, so that melt heat loss is minimized, but still take time (no more than 3 s) to inspect both melt patterns. Keep the heater dry at all times. Check the temperature of the heating tool regularly with a pyrometer or other surface temperature measuring device. Keep the heating tool in an insulated container between fusions. Do not increase heating tool temperature above the specified temperature setting. Gas-fired heating tools are used only in above freezing conditions.

2.5.3 Socket Fusion

2.5.3.1 Pipe Outside Diameter—Pipe outside diameter contracts when cold. This results in loose or slipping cold rings. For best results, clamp one cold ring in its normal position adjacent to the depth gage. Place shim material (that is, piece of paper or rag, etc.) around the inside diameter of a second rounding ring and clamp this cold ring directly behind the first cold ring to prevent slippage. The first cold ring allows the pipe adjacent to the heated pipe to expand to its normal diameter during the heating cycle.

2.5.3.2 Fitting Condition—If possible, store socket fittings at a warm temperature, such as in a truck cab, prior to use. This will make it easier to place the fitting on the heating tool because fittings contract when cold.

2.5.3.3 Heating—At colder temperatures the pipe and fitting contract, thus the pipe slips more easily into the heating tool. At very cold outdoor temperatures (particularly with IPS 2, 3, and 4-in. pipe), the pipe may barely contact the heating surface. Longer heating times are used so that the pipe first expands (from tool heat) to properly contact the heating tool, then develops complete melt. The length of time necessary to obtain a complete melt pattern will depend not only on the outdoor (pipe) temperature but wind conditions and operator variation. Avoid cycles in excess of that required to achieve a good melt pattern. To determine the proper time for any particular condition, make a melt pattern on a scrap piece of pipe, using the heating time as instructed by the pipe manufacturer. If the pattern is incomplete (be sure rounding rings are being used), try a 3 s longer cycle on a fresh (cold) end of pipe. If the melt pattern is still not completely around the pipe end, add an additional 3 s and repeat the procedure. Completeness of melt pattern is the key. Keep the heater dry at all times. Check the temperature of the heating tool regularly and keep the heating tool in an insulated container between fusions.

2.6 Quality Assurance Recommendations—It is recommended that the following steps be followed to help insure quality fusion joints.

2.6.1 Make sure the equipment or tooling used to make the fusion joints is in good working order and conforms to the equipment manufacturer’s quality assurance guidelines.

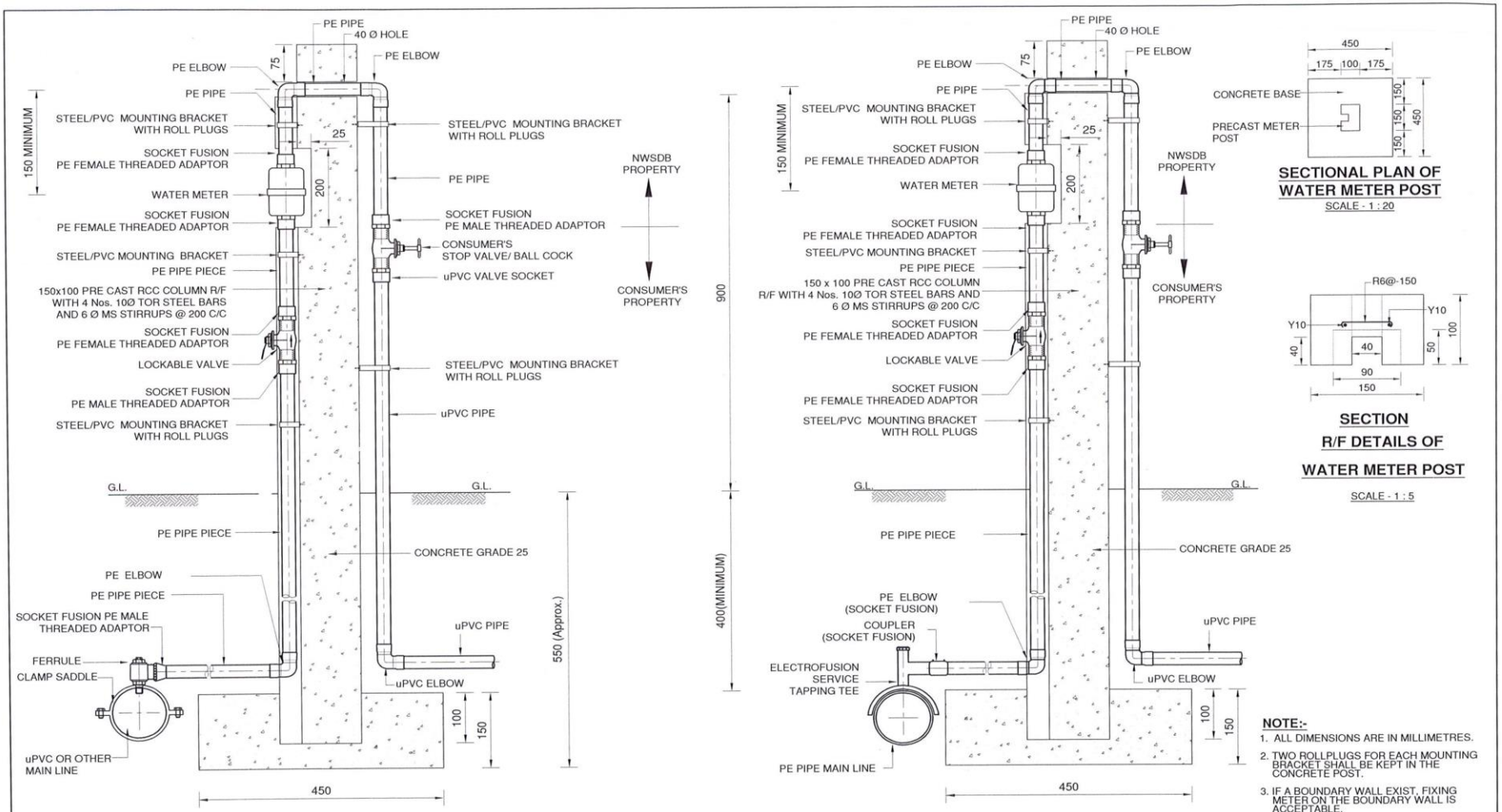
2.6.2 Make sure the operator of the equipment or tooling to be used has had the proper training in the operation of that equipment.

2.6.3 If possible, use a datalogging device with hydraulic joining equipment to record the critical fusion parameters of pressure, temperature and time for each joint.

2.6.4 Visually inspect each joint and. compare the datalogged records to this approved standard before burying the pipe.

Table 1 Socket Fusion Time Cycles

	PE 80/PN 10(PE 2406)		PE 100/PN 16 (PE 3408)	
Pipe Size	**Heating Time Seconds**	**Cooling Time Seconds**	**Heating Time Seconds**	**Cooling Time Seconds**
20mm	6-7	30	6-10	30
25mm	6-7	30	6-10	30
32mm	9-10	30	9-16	30


PE PIPE
40 Ø HOLE
PE ELBOW
PE ELBOW
PE PIPE
STEEL/PVC MOUNTING BRACKET WITH ROLL PLUGS
SOCKET FUSION PE FEMALE THREADED ADAPTOR
WATER METER
SOCKET FUSION PE FEMALE THREADED ADAPTOR
STEEL/PVC MOUNTING BRACKET
PE PIPE PIECE
150x100 PRE CAST RCC COLUMN R/F WITH 4 Nos. 10Ø TOR STEEL BARS AND 6 Ø MS STIRRUPS @ 200 C/C
SOCKET FUSION PE FEMALE THREADED ADAPTOR
LOCKABLE VALVE
SOCKET FUSION PE MALE THREADED ADAPTOR
STEEL/PVC MOUNTING BRACKET WITH ROLL PLUGS
150 MINIMUM
75
25
200
STEEL/PVC MOUNTING BRACKET WITH ROLL PLUGS
PE PIPE
SOCKET FUSION PE MALE THREADED ADAPTOR
CONSUMER'S STOP VALVE/ BALL COCK
uPVC VALVE SOCKET
NWSDB PROPERTY
CONSUMER'S PROPERTY
STEEL/PVC MOUNTING BRACKET WITH ROLL PLUGS
uPVC PIPE
900
G.L.
G.L.
PE PIPE PIECE
CONCRETE GRADE 25
PE ELBOW
PE PIPE PIECE
SOCKET FUSION PE MALE THREADED ADAPTOR
FERRULE
CLAMP SADDLE
uPVC PIPE
uPVC ELBOW
uPVC OR OTHER MAIN LINE
100
150
550 (Approx.)
400(MINIMUM)
450
uPVC OR OTHER MAIN LINE
NOT TO SCALE
PE PIPE
40 Ø HOLE
PE ELBOW
PE ELBOW
PE PIPE
STEEL/PVC MOUNTING BRACKET WITH ROLL PLUGS
SOCKET FUSION PE FEMALE THREADED ADAPTOR
WATER METER
SOCKET FUSION PE FEMALE THREADED ADAPTOR
STEEL/PVC MOUNTING BRACKET
PE PIPE PIECE
150 x 100 PRE CAST RCC COLUMN R/F WITH 4 Nos. 10Ø TOR STEEL BARS AND 6 Ø MS STIRRUPS @ 200 C/C
SOCKET FUSION PE FEMALE THREADED ADAPTOR
LOCKABLE VALVE
SOCKET FUSION PE FEMALE THREADED ADAPTOR
STEEL/PVC MOUNTING BRACKET WITH ROLL PLUGS
150 MINIMUM
75
25
200
NWSDB PROPERTY
CONSUMER'S PROPERTY
G.L.
G.L.
PE PIPE PIECE
CONCRETE GRADE 25
PE ELBOW (SOCKET FUSION)
COUPLER (SOCKET FUSION)
ELECTROFUSION SERVICE TAPPING TEE
uPVC PIPE
uPVC ELBOW
PE PIPE MAIN LINE
100
150
450
PE MAIN LINE
NOT TO SCALE
450
175 100 175
CONCRETE BASE
PRECAST METER POST
150
150
150
150
450
SECTIONAL PLAN OF WATER METER POST
SCALE - 1 : 20
R6@-150
Y10
Y10
40
40
50
100
90
150
SECTION R/F DETAILS OF WATER METER POST
SCALE - 1 : 5
NOTE:-
1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. TWO ROLLPLUGS FOR EACH MOUNTING BRACKET SHALL BE KEPT IN THE CONCRETE POST.
3. IF A BOUNDARY WALL EXIST, FIXING METER ON THE BOUNDARY WALL IS ACCEPTABLE.
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தேசிய நீர் வழங்கல் வடிகாலமைப்புச் சபை
NATIONAL WATER SUPPLY AND DRAINAGE BOARD
TYPE DRAWING
SERVICE CONNECTION - 20Ø AND 25Ø
uPVC OR OTHER MAIN LINE & PE MAIN LINE
REV.
DESCRIPTION
DATE
SIGN.
Sameera
DRAWN
D.O.A.
WT510/SC/01
Drg.No.
ENGINEER (D)
C.E. (D)
05-02-2020
DATE
A.G.M. (P&D) / SPECIALIST
D.G.M. (P&D)